

Attachment #7  
Rpt. Misc. - 35

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2 July 64

SUBJECT: Quarterly Review Conference - PAR 213

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VISITOR:

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FROM

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1. [ ] indicated interest as to the approach taken in order to meet the requirements of this PAR.

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2. Approach:

a. [ ] took up the discussion and indicated we actually deal with two (2) problems in this PAR, acquisition and duplication. In effect, factors of the acquisition phase limit our choice of duplicating systems.

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b. Scene luminance ratios have been observed ranging from 18:1 to 30:1 at an altitude of 12,000 feet. At ascending altitudes above 50,000 feet, the luminance ratio is known to be reduced to as low as 4:1 from black-and-white systems. This 4:1 ratio related to the apparent brightness as the camera sees it. Haze effects and color balance shifts with higher altitudes require changes in the film types used. Thus the luminance range in a transparency for a given scene on the ground would be dependent on the duplicating material and the process used. These factors are all inter-related.

3. Kodachrome Example:

a. On this subject, it was indicated that scenes at a 4:1 luminance ratio produce originals at 8:1 and duplicates at approximately 18:1 when the duplicating film has a process contrast of 2.60.

b. At 12,000 feet, 30:1 is a representative maximum. This would cover the water surface type of scene where the luminance goes from almost black to specular light. At 50,000 feet or higher, 98 percent of the scenes might be about 4:1 or less. Some scenes at this altitude, depending on subject might approach 18:1.

4. Color Film 6513 (Acquisition) - Information given on this material was as follows: This material is a reversal type film on thin base with incorporated couplers. A higher than normal scene range might cause it to appear somewhat high in contrast. However, this characteristic does tend

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to minimize the haze effect. It has not been flown at high altitudes. The average contrast of 6513 is approximately 2.70. However, this figure is not usable in evaluation; the contrast for each layer is required. We use the terms gamma and average gradient in our evaluation: Gradient (between densities of 1.00 and 2.00) is more realistic for color because the middle portion of the curve has a much shorter straight line portion than black-and-white films.

5. Color Film SO-121 (Acquisition): The best acquisition film to date is SO-121, a reversal material with incorporated couplers. It is equal to or better than Kodachrome II. Resolution in terms of  $>10:1$  and  $1.6:1$  contrast is 151 and 76 lines per millimeter respectively. This material was only recently available and has not been flown above 12,000 feet. It can be successfully duplicated back on to itself if high contrast can be tolerated. We are currently arranging for flights in excess of 50,000 feet. We are now in a basic study of high altitude acquisition in order to make a firm selection of duplicating materials and processes.

6. General Comments on Color:

a. We are now getting the best color rendition possible; not "true" color. The major emphasis is on the second generation transparency.

b. PITA will give special consideration to "false" color for special applications, but the major effort is for a good general use material.

c. We believe color is better than black and white in several ways and want to prove this by making all of the duplicate transparencies, prints and enlargements etc., which will demonstrate its advantages. No one product will do everything we would like; and so far as resolution is concerned, we can improve but will never attain in color the resolution capabilities of black and white.

7. Variable Color Viewer:

a. We are considering the feasibility of a variable brightness but constant color temperature viewing light source with the additional capability of variable color. This is considered superior to the Kinescope approach.

b.  requested that we make up 20 inches by 24 inches briefing boards for demonstration to his people. He would also like

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3 1/4 inches by 4 inches slide transparencies and some enlargements (transparencies) not larger than 9 inches by 9 inches. We agreed to do this, however, we believe this effort should be deferred until better high altitude photography is available from which to make the reproductions.

8. Presentation of Duplicate Transparencies and Reflection Prints:  
Demonstration material shown consisted of the following combinations:

a. High Definition Color Film (CF-6513) (Incorporated Couplers):  
This material was flown at medium altitude (12,000) and was shown in duplicate transparencies (Stereo Pairs).

(1) Three scenes of stereo pairs were selected for further generation effort even though the original material was underexposed by approximately 1.3 camera stops.

(2) The original positive color transparencies were difficult to print, but this was considered as being a condition likely to be encountered in an operational mission.

(3) The same scenes were printed onto [ ] Special Color Duplicating Film, SO-271. The sizes were 1:1, 5X, 10X and 19X. The quality was considered only fair because of the wide scene latitude resulting in reproductions of high contrast. Resolution was good for all sizes except the 1:1 transparency.

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(4) Color transparencies 1:1 were also contact printed onto Ektachrome Commercial Film, Type 7255. The resulting quality was excellent for color balance and definition but this material may be too low in contrast for scenes of narrow latitude.

(5) Reflection print enlargements (5X, 10X and 20X) were produced on [ ] Ektachrome paper. The resulting quality was considered unacceptable because of poor color balance and lack of color fidelity.

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(6) The same originals enlarged 5X onto [ ] Ektacolor Internegative Film, Type 6110, then enlarged 1, 2 and 4X onto Ektacolor Professional paper show considerable promise. The results were judged as excellent.

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b.  High Definition Aerial Film, Type SO-121 (Incorporated Couplers): Acquisition during late spring, altitude 12,000 feet. Areas similar to those photographed on CF-6513 were selected for further study of duplicating methods.

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(1) These scenes were contact printed onto Type 7255, SO-121 and Kodachrome II, Type 5029. High contrast was evident in the SO-121 and 5029 transparencies. The high contrast may be desirable for high-altitude scenes of short latitude. The type 7255 transparencies were excellent for color balance. The best resolution was seen in the 5029 reproductions.

(2) The same scenes were demonstrated through the Type 6110 Internegative-Ektacolor Professional paper system as 5X, 10X and 20X reflection prints. The quality was excellent and demonstrated the effect of shutter speed variations within a single frame.

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